Equations and Constants

TEMPERATURE

$T_{\circ F} = \frac{1.8°F}{1°C}(T_{\circ C}) + 32°F$

$T_K = \frac{1K}{1°C}T_{\circ C} + 273.15K$

ENERGY, LIGHT, AND HEAT

$\Delta E = q + w$

$q = C_p m \Delta T$

$-q_{(rxn)} = C_v \Delta T_{(calorimeter)}$;

$J = \frac{kg \bullet m^2}{s^2}$

$\Delta E = h\nu$, $c = \upsilon\lambda$

ΔE = KE + PE, where PE is the work function.

$\Delta E_{el} = \frac{kQ_1Q_2}{d}$

$\frac{1}{\lambda} = R_H\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$

$\Delta E = -R_H\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$

#radial nodes = n – *l* –1

PRESSURE, GASES

PV = nRT and PMM = dRT; P=Ghd

$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$

$\sqrt{\frac{MW_1}{MW_2}} = \frac{rate_2}{rate_1}$

$\mu_{rms} = \sqrt{\frac{3RT}{MW}}$

S of gas = $k_{(Henry's\ constant)}P$

Manometer: $P_{gas} = P_{atm} \pm P_{Hg}$ (operation depends on whether pressure is higher or lower than atmospheric)

CONSTANTS, ETC.

Density of water @4°C = 1.000 g/mL

Ideal gas constant:

R = 0.08206 L-atm/K•mol

R = 8.314 J/mol•K

Specific heat of water:

$C_{p(H2O)}$ = 4.184 J/g•°C

Avogadro's number is =

6.02214 x 10^{23} "things" = 1 mol of "things"

Planck's constant: h = 6.626 x 10^{-34}Js

Rydberg's constant:

R = 2.179 x 10^{-18} J

1.0968 x $10^7 m^{-1}$

Speed of light, c, = 2.998 x 10^8 m/s

The Debye:

1D =3.335 64 x 10^{-30} C• m

Charge of electron

1*e* =1.602 177 x 10^{-19}C

LENGTH

2.54 cm = 1 in

1 mi = 1.6093 km

12 in = 1 ft

3 ft = 1 yd

5,280 ft = 1 mile

1 Å = 10^{-10}m

MASS

1 lb = 453.59237 g

1 oz = 28.35 g

1 kg = 2.2046 lb

1 amu = 1.660 539 040 x 10^{-24} g

16 oz (dry) = 1 lb

1 t (ton, short) = 2000 lb

1 tonnes or 1 metric ton = 1000 kg

TIME

60 min. = 1 hr

24 hr = 1 day

365 day = 1 yr.

VOLUME

1 L = 1.0567 qt

1 L = 1 dm^3

1 gallon = 3.7854 L

4 qt = 1 gal

1 quart = 32 fl oz

PRESSURE

1 atm = 101.325 kPa

1 atm = 760 mmHg, 760 torr

22.4 L = 1 mol

TABLES:

- ◊ Periodic table
- ◊ Electronegativities & bond enthalpies
- ◊ Solubility chart
- ◊ Activity series

THERMOCHEMICAL DATA

$\Delta H°f(CO_{2(g)})$ = –393.5 kJ/mol,

$\Delta H°f(H_2O_{(l)})$ = –285.840kJ/mol

$\Delta H°f(H_2O_{(g)})$ = –241.82kJ/mol

MISCELLANEOUS

$\mu = Qr$

V of a sphere= $\frac{4}{3}\pi r^3$,

V of a cubic solid = X^3,

V of a cylinder = $\pi r^2 h$